Chapter 1

What is Business Intelligence

Business Intelligence (**BI**) means different things to different people. The reasons for this situation are multifold which we will see later in this chapter. What this means for learners is that it is confusing; it places them in a situation where they are not sure which one to trust, not sure which one to learn, and with all the well-marketed and biased information out there, not sure how to separate myths or misconceptions from the facts. So, there is a definite need to reintroduce BI, explain what it really is and what it's not, and focus on the concept of BI rather than on specific tools and technologies. This chapter attempts to address the aforementioned issues by providing an unbiased definition and explanation of BI concepts based on industry experience.

This chapter is very important as it will lay down the foundation for the rest of the book. It is highly recommended to not skip this chapter. After reading through this chapter, you should be able to define BI clearly and explain each of the important terms used in the definition. This chapter will also clear out some of the misconceptions about BI, provide reasons for these confusions, throw light on some of the realities, and help you understand what exactly BI is and what it is not. At the end of the chapter, we will deal with the details related to the coinage of the term BI.

It is expected from the reader to at least have a basic understanding of business and **information technology** (**IT**). Those who have some knowledge of BI will be able to appreciate the myths, misconceptions, and issues dealt in this chapter. For those who are new, it might be difficult at first to appreciate the misconceptions mentioned

in this chapter, yet you will benefit from it and have a good start by learning the concepts.

Structure

The following topics will be covered in this chapter:

- Introducing BI
  - Real examples of misconceptions about BI
  - Reasons for misconceptions about BI
  - Definition of BI
    - ❖ Key terms in the definition of BI
- Working of BI
- Realities of BI
  - BI is a concept
  - BI doesn't solve problems
  - Insights from BI is one of the inputs for decision-making
  - Ideal BI solutions are rare
  - BI solutions serve a variety of users
  - It doesn't cost millions and multiple years
- Demystify coinage of BI

Objectives

To understand some of the misconceptions and realities about BI and the reason for such misconceptions. To understand the concept, learn a clear definition, and the contextual meaning of key terms in the definition of BI. The readers will also learn about some of the inputs necessary for decision-making, and become familiar with an architecture of a contemporary BI solution.

Introducing BI

As aforementioned, it has become difficult to separate the myths and misconceptions from the facts. This is probably one of the main reasons why you are reading this book—to demystify BI and clear out such misconceptions. If you were to question 10 people in the IT industry about what BI is, there's a chance that you will hear 10 or even more different answers. Some of the answers maybe partially correct, some totally incorrect, and if you are lucky you might get one or two correct answers.

Some of the answers that you may hear are as follows:

- BI is just a frontend tool to get reports
- BI is a tool to get copies of online transaction data
- BI is same as data visualizations
- BI is same as business analytics or is a subset of business analytics or business analytics is a subset of BI
- BI is a portal that provides all information to enable decision-making
- BI is everything to do with data including big data analytics.

You may hear many variations of this answer as well. Even though some segments of business users—IT professionals, managers, etc., understand BI sufficiently and use it effectively, there is a fair share within those segments, who neither understand nor are able to separate the misconceptions from the facts. Let's take a look at some of the real-world examples.

Real examples of misconceptions about BI

A **senior vice president** (**SVP**) of a large company, once wrongly assumed that the "I" in the term "BI" stands for information (data is what he meant) instead of intelligence. The SVP, like a few others, also thought that the core responsibility of the BI team was to carry out operational data transfer between core systems in the enterprise for day-to-day operations and that the team had nothing to do with the decision-making process. His view was, for decision-making, **management information system** (**MIS**) should be used. He is partially right, in the past MIS was used, this was mainly for the top management.

Few years ago, an experienced **business analyst** (**BA**) in a product company asked me (back then I had just joined as a Business Intelligence Business Analyst), "*you are the BI guy, right? Do you guys work on improving the performance of the operational databases so that the performance of the core applications is faster? Is that what you and your team plan to do? Will your team monitor the queries that are hitting the application databases?*". In this case, the BA had got it wrong by equating BI with a **database administrator** (**DBA**).

In another instance, a business user from the client side in a BI project was not aware that he had the necessary access to create his own reports using **Business Objects** (**BO**) tool (a widely used enterprise reporting and analytics platform), which he had access to since years. This BO tool was deployed 4 years earlier and was connected to a data warehouse. He wrongly assumed that the data warehouse was only for data storage purposes. He was pleasantly surprised when I demonstrated to him that he could actually create his own reports and carry out ad-hoc data analysis.

In another company, where BI adoption rate was very high (over 90% of the office staff used BI), more than 50% of the BI users in the company assumed that all of the information and insights presented in the portal was developed by the portal development team, the team that had nothing to do with the main part of the BI work. BI users were unaware of the BI team's existence even though the BI team had over 20 team members.

Similar to these examples, there are other real-world examples where BI and BI teams, both have been misunderstood. I have observed such misunderstandings about BI in companies, in social media (LinkedIn for example), in blogs, and in Q&A forums. We can continue listing such examples, but I think you already get the point that there is a misunderstanding, a confusion, and a lack of clarity about BI. *Figure 1.1* picks up points from the preceding examples and visualizes the misconceptions from the facts using thumbs-down and thumbs-up respectively.

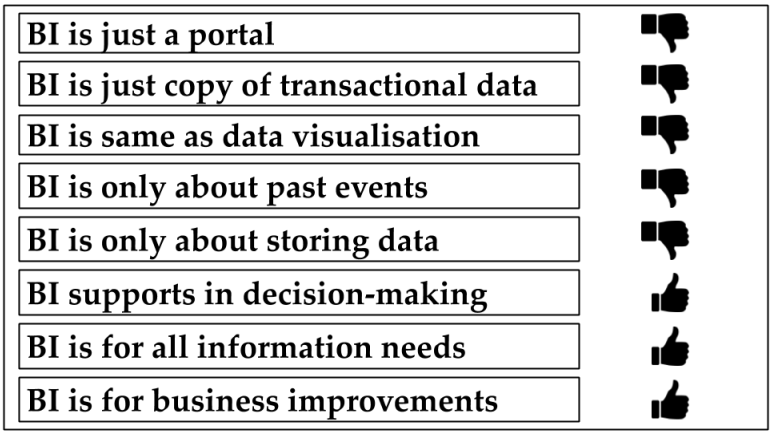

***Figure 1.1**: Right and wrong ideas about BI*

Reasons for misconceptions about BI

Connecting all of the aforementioned examples, the question we should ask is, why is there so much confusion in the industry about BI? Why is there such a difference in how people perceive BI? Broadly, there are four explanations for it. First, have you heard of the blind men and an elephant story?[15] Six blind men had never known what an elephant looks like, one day each person feels a different part of the elephant's body as shown in the following *Figure 1.2*, and describes it differently compared to each other based on their limited experience. That exactly is the first reason. People describe BI based on their limited experience, they haven't seen or used the whole of it, but only part of it.

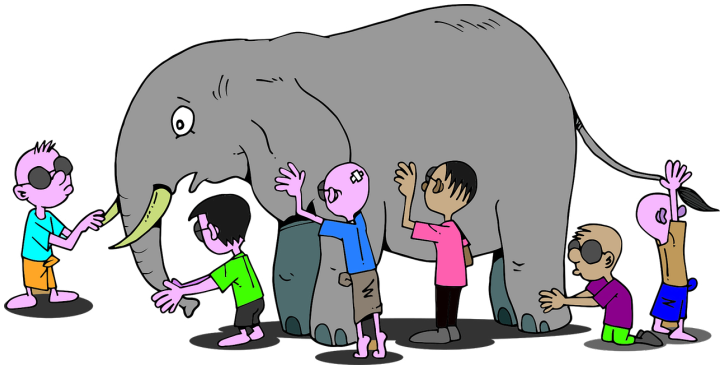

***Figure 1.2**: Blind men and an elephant*

Second, market players, especially software vendors, training institutes and consulting companies that expand, contract, or modify the definition to position their products/services in the market and make them stand out. For example, we can notice false claims such as "*our tools deal with unstructured data whereas BI doesn't deal with unstructured data*", "*BI is limited to descriptive analytics only, whereas our tool offers predictive analytics*", and so on. Furthermore, almost every other day a new technical term is introduced, few of which go on to become buzzwords. Once there is a buzzword, new BI vendors and IT service companies, with an army of consultants promote it and take it forward by offering tools, solutions and services around the buzzword. They pitch it to their clients and some clients fall for it and go ahead with implementation even if there wasn't any need to introduce that new technology, tool, software, etc., for that particular business. Soon after, every other company irrespective of whether it's a product company or a service-based company start their own initiatives to not be left behind. Big data is a good example for such a buzzword. The cycle of how new technical terms are repeated is depicted in *Figure 1.3*:

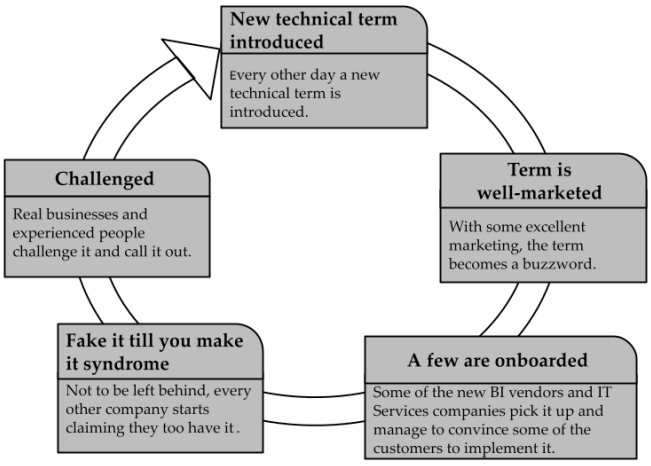

***Figure 1.3**: The cycle of new technical terms*

So, it naturally becomes very difficult for people to not get confused. And most practitioners, who have worked on real projects, have built BI solutions, and continue to work in BI, don't usually take out time to write and clear the confusion.

Third, a segment of stakeholders, mostly business users, wrongly assume or are made to believe that BI is just a reporting tool or a portal from which they can get their reports. As the frontend (reporting tool, portal, data visualization tool, etc.) is the only tool that they usually access, they wrongly assume that the frontend is the whole BI solution. It couldn't be further from the truth. It is almost the equivalent of believing that cars are manufactured in showrooms where they are sold just because that is where we buy them. We all know, even if not the whole process, that there are many stages, for example, sourcing raw materials, manufacturing parts, assembling, painting, etc., involved in the background before a car is made available at the showroom for sale. Similarly, to create the reports that business users need, and to provide a **reporting and analytics platform** (**RAP**), there are several backend processes involved in transforming the data into relevant information and insights in a scalable and efficient way. All of these together is what constitutes a BI solution. Similar to how a car dealer is not equivalent to a car manufacturer, a reporting tool is not equivalent to a BI solution. A reporting tool or a portal in itself is not a BI solution, it's a part of the BI solution, and remember it's usually the only part of the solution that business users get to use/see.

Fourth, unfortunately there aren't any authorized bodies or organizations to provide a standard definition of BI. There are multiple organizations that have defined BI but unfortunately it is not standardized. Forrester[16] defines BI as "*A set of methodologies, processes, architectures, and technologies supported by organizational structures, roles, and responsibilities that transform raw data into meaningful and useful information used to enable more effective strategic, tactical, and operational insights and decision making that contribute to improving the overall enterprise performance*". This definition is different from Gartner's definition of BI in 2016,[17] "*BI is an umbrella term that includes the applications, infrastructure and tools, and best practices that enable access to and analysis of information to improve and optimize decisions and performance*". As of writing, Gartner has already renamed/updated BI to **Analytics and Business Intelligence** (**ABI**) [18] with exactly the same definition as above that was provided for BI in 2016. In this book, we will continue to refer to ABI as BI, which means analytics is a part (subset) of BI as we are using BI as an umbrella term that encompasses business analytics/data analytics. In this entire book, we will always refer to BI in the sense of an umbrella term.

As we have seen, Gartner's definition of BI is different from that of Forrester. Similarly, other organizations have defined BI differently compared to both Gartner and Forrester.

If these different definitions and terminologies are overwhelming you, worry not, once you understand the concept, you'll be able to define it in your own words.

Understanding the concept is more important. It's important to bear in mind that new fancy names will continue to popup, but the concept will remain the same. The core concept of BI is to use data to derive information and insights in order to support decision-making to improve the business. Technology to implement a concept will always continue to change and evolve, but the concept remains the same. Let me explain this point with a simple analogy, let's assume a vendor stores their customer's master data in an Excel file and refers to it as customer master data. Now if the customer data becomes so large that it can no longer be stored in an Excel file but only in a database (RDBMS), we would still call it customer master data and not large data. We don't change the name of a concept based on the technology or tool that implements the concept. Technology to implement BI, as with any other concept, is constantly evolving. It has become important, now more than ever to provide a definition that is business-oriented, current, and clear, a definition that any businessperson can relate to and can easily remember. I base the following definition on my hands-on experience in implementing BI solutions at various companies across locations that have used BI to improve their business.

Definition of Business Intelligence

Business Intelligence is an umbrella term that refers to the overall process in which information and insights are derived from data in a scalable, efficient, and on-going basis and made available to decision makers to support in data-driven decision-making in order to improve their business.

Key terms in the definition of BI

We will now explore in detail each of the key terms in the preceding definition:

- **Process**: The definition of BI itself should already make it clear that BI is a concept and a process, and not a technology or a prescribed set of tools. Process here is used in the sense of an overarching term that has several processes under it. Process includes technologies, business-specific strategies, tools, methodologies, architectures, best practices, and most importantly the people in the business. If we consider BI as a black box, then what goes inside (input) into the black box is data and the output is information, which then leads to insights. In *Figure 1.4*, we can see BI as a black box with data as input and information and insight as output of the BI process.

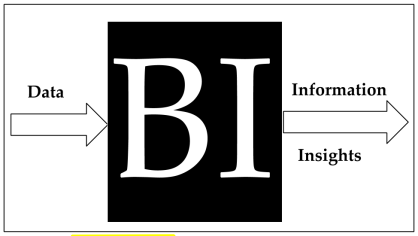

Figure 1.4: *BI as a black box*

- **Data**: In the context of BI, data is the raw form, it is the transactional or operational level records or stored values from which information and insights can be derived after processing. Data can be a collection of numbers, text, images, audio, video, etc. Data can be stored in any form, size, and location. Data gets generated whenever any event or transaction occurs or just based on the current state or status of some object of interest.

  Data is not limited to internal business (proprietary) data; data here refers to all sorts of data from any source including external, third party, or market data that is relevant for the business. Internal data, for example, could be employee related data (name, address, phone number, gender, etc.), products and services data, or customer related data (server logs, web clicks, app usage, call centre data, product reviews, ratings, etc.) *Figure 1.5* showcases some of the formats and sources of data:

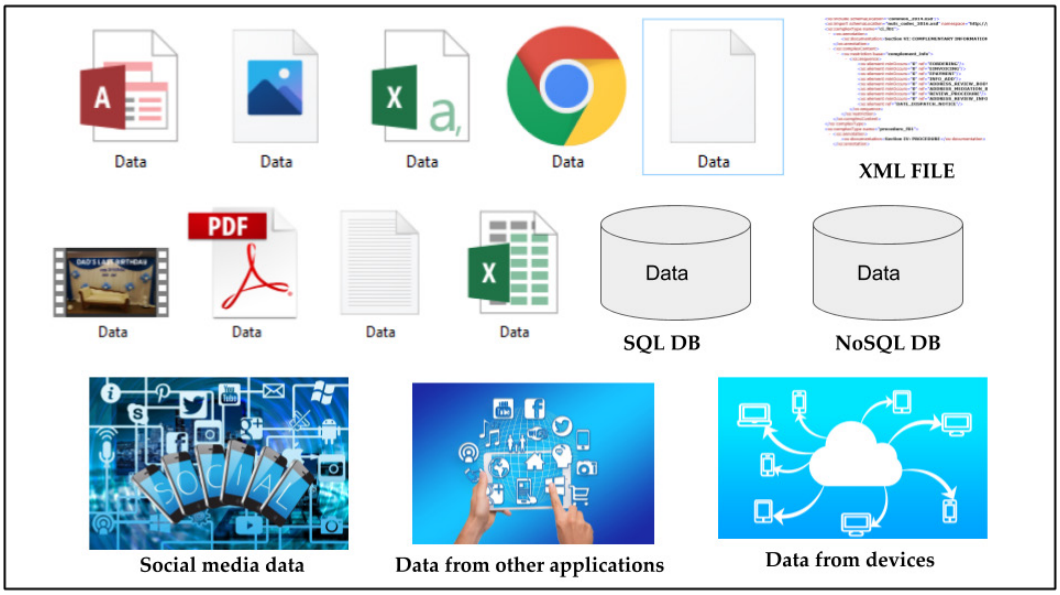

***Figure 1.5**: Some of the formats and sources of data.*

As there is a misconception that BI is limited to only structured and internal data, let me clarify and emphasize that data can be collected from various sources such as customer management systems, billing systems, HR systems, websites, apps, log files, devices, social media, etc. External data on the other hand includes market or syndicated data, for example, Nielsen retail data or open data from any other data provider.

Anything and everything that can be used to derive business relevant information is data. The much-hyped buzzword and the so-called big data is also data. We can notice that some people who are new to the field of data are

talking about data and big data as if big data is something outside of data, that's simply and logically not correct, big data, at max, is a subset of data. It is important to note that in reality there is no such thing as small data or big data, all of the data that can be used to derive information and insights about a business, no matter where it is generated from or how it's generated, whether structured or unstructured, is an input to the BI process. Data can be stored in files (CSV, Excel, XML, JSON, etc.) or in databases (SQL, NoSQL, distributed) or in any other format. Data could be human-readable or not human-readable (only machine-readable) or both.

Note that there is a subtle difference between everyday usage and technical usage of the term data. In everyday usage, data (that which we are talking about now) is often referred to as information but in technical (IT) usage it is referred to as data. Data in BI is the raw data (unprocessed data) for a lay person.

- **Information**: When context and meaning is added to data and it's arranged appropriately it becomes information. In other words, data has the potential to provide information when context and meaning are added to it. Data is the foundational layer based on which information is built. Context to data is provided through metadata (information about data) and meaning is provided through explanation and description of how to use it and what to use it for. Data is processed to derive information from it. It's to be noted that unlike other processes where raw material is transformed to a product and that particular raw material no longer exists, in case of data, even after information is derived, raw data continues to exist.

- **Insight**: Insight is a deeper understanding or knowledge gained from processing (analyzing, synthesizing, correlating, drilling up/down, combining, verifying, validating, etc.) of information. It is the knowledge that is gained after carefully studying the information, it is not apparent or obvious at first glance. Insight is knowledge based on which important decisions are made.

  By carrying out data analysis on data that we have collected on any subject, we can find trends, patterns, identify outliers, correlations, and understand more about the subject. It is important to note that insights are contextual, situational, and they can be subjective. An insight for one category of users may not necessarily be an insight for another category of users. For example, an insight to an HR manager about employee behavior need not necessarily be an insight to a sales manager or a marketing manager in the same company as their responsibilities are different. Insight is the second or next level output of BI, the first level output is information. Based on the information derived from data, insight is obtained when users iteratively look for more answers/details in BI. Conclusions and decisions are made based on insights. Actions

are triggered based on insight. In this book data, information, and insights are used according to explanations provided above.

- **Business**: The term business in the BI definition is not limited to commercial enterprises. It is used in a generic sense, referring to all organizations including government bodies, not-for-profit organizations, even organizations such as police departments, that use BI to improve their operations. In this book the terms business and organization are used interchangeably.

- **Intelligence**: It is that which is known about a subject or a situation. In BI, the subject is business. The US Department of Defense Dictionary of Military and Associated Terms defines intelligence as *"The product resulting from the collection, processing, integration, evaluation, analysis, and interpretation of available information concerning……"*, based on this we can state that here in BI, intelligence is the product resulting from the collection, processing, integration, evaluation, analysis, and interpretation of available information concerning a business.

- **Data-driven**: Data-driven decision-making means that the decision makers (mostly management) of businesses take decisions supported by information and insights derived from data and not just based on feelings or intuition. This in no way implies that all decisions based on feelings or intuitions are always wrong or that all decisions based on BI are always right. When organizations grow, it becomes increasingly difficult, if not impossible, for the active founder or the CEO or only the top management to make all of the decisions. The responsibility of decision-making at different levels is delegated to employees at appropriate levels. In such cases, how can organizations ensure that the decision makers make the right decisions to improve the business most of the time? How can organizations increase the probability of the decisions to be right? BI enables decision makers to make more insightful and fact-based decisions, thereby building a data-driven culture in the business.

- **Improve**: The word *improve* in the BI definition has been overlooked by many. If data is used to carry out regular operations of the business, let's assume, for example, a customer orders a book from an online bookstore, the online bookstore company uses this data to process the order and delivers the book at the right address. This usage of data (customer address in this case) to deliver the book doesn't fall under BI. There is no decision made to improve the existing business. It is a regular business operation or transaction. Capturing orders and delivering books are core functions of this business in the example.

  When we use data for BI, we are using data for more purposes than what it was originally meant for. BI is an add-on to the core functions. The expectation for

using BI is to improve the business, this includes improvements in products, processes, service improvements, employee performance improvement, gaining new markets, etc. In the online bookstore example, the company could use sales data to identify patterns and use the gained knowledge for improving its business. Let's assume that, the bookstore identifies a pattern based on sales data that there are considerably less orders on Wednesdays, it can then use this knowledge to take some action, for example, launch a promotion with discounts on books sold on Wednesdays in order to increase the sales.

- **On-going, scalable, and efficient**: BI is not a one-off activity that businesses can carry out for a day or a week and then forget about it. It is a regular and continuous process. Information and insights are derived regularly (at least daily if not more frequently), and the health of the organization is monitored.

  If you give it a thought, BI in simple terms is actually the automation or semi-automation of the information and insights generation process. Just think through as to how was it done before BI or how is it done in companies that don't use BI? In most cases, the decision-making process is/was as depicted in *Figure 1.6*:

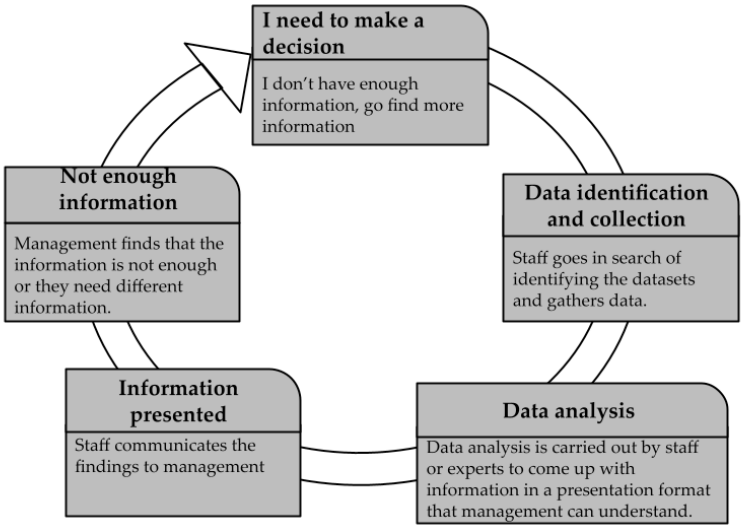

***Figure 1.6**: An example of a decision-making process before BI*

When managers needed to make decisions, they either used their intuition or ordered their staff to collect information and generate insights. The staff then went about gathering data manually from various systems, analyzed it, and provided the information and insights to the manager. When the information and insights was not sufficient or as per the manager's expectations, the staff

was asked to look further. This cycle, as depicted in *Figure 1.6*, would go on to repeat a few more times, until the managers were able to get some reliable information and insights.

As you can see, this process was not scalable, nor was it efficient. This is the real pain point that BI is able to address. It automates data collection, storage, data preparation, and presentation. Information is kept ready before it is asked. BI is a proactive way of managing a business. BI is both scalable and efficient. BI can save days or weeks or months of manual work, thereby enabling users to do their job better.

Working of BI

A simplified explanation of how BI works was provided in *Figure 1.4*. If we consider BI as a black box, then data is the input whereas information and insights are the output from BI. Let's expand on the black box example—add some data sources on the input/left side and add the users on the right/output side, the result is the following *Figure 1.7*:

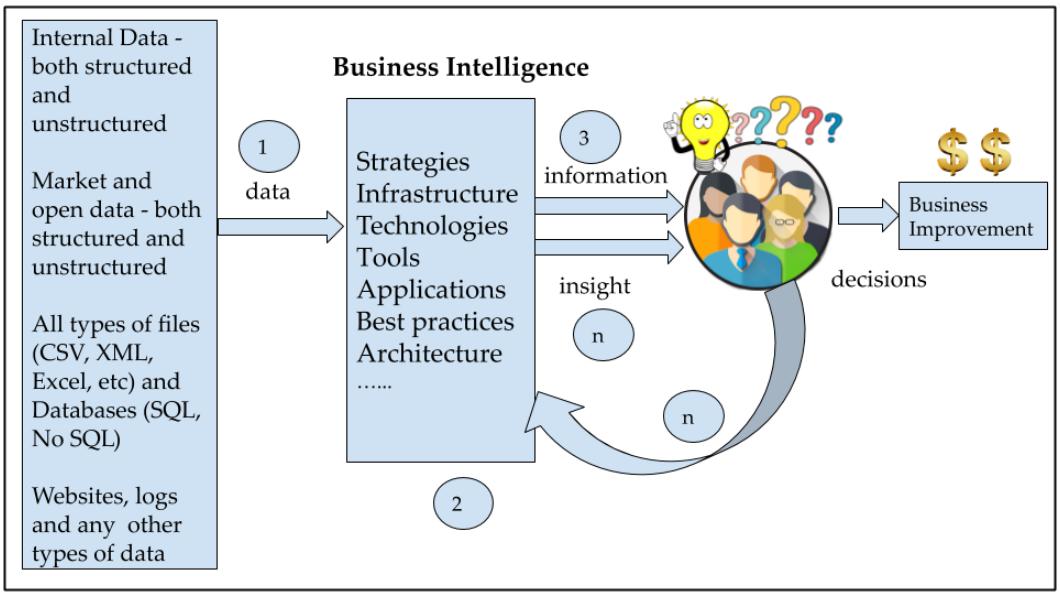

***Figure 1.7**: Working of Business Intelligence*

The earlier black box now contains business specific strategies, infrastructure, technologies, tools, applications, best practices, architecture, and more. The first output (information) is expected to provide a quick overview of the business and trigger ideas or questions in the minds of the users. Based on those ideas or questions, BI users can explore further to get more details or information. This is an iterative

process, where after a few iterations (marked as *n* times in *Figure 1.7*) the users get the insights based on which they can arrive at conclusions and make decisions in the hope of improving their business. If the users don't get ideas or questions when they take a look at the first output (information) of BI, then either they already know everything that BI output is showing them or there is something wrong with the BI setup. Note that as mentioned earlier BI is not a one-off process, BI is a continuous process, a continuous journey from data to information to insight to decisions to business improvements as depicted in *Figure 1.8*:

***Figure 1.8**: Data to information to insight to decisions to business improvement*

Now that we have covered the definition of BI and its working, let's look at some of the realities and misconceptions about BI.

Realities of BI

As we'll look at the realities of BI, we will also clear out some of the myths and misconceptions relevant at this point. The six realities of BI relevant to this chapter are as listed:

- BI is a concept
- BI doesn't solve problems on its own
- Insights from BI is one of the inputs for decision-making
- Ideal BI solutions are rare
- BI solutions serve a variety of users
- BI is not always expensive and a multi-year project

BI is a concept

BI is a concept, it doesn't prescribe any particular technology, tools, methodologies, or project/product management techniques. BI is agnostic to technologies, tools, and methodologies. BI, in most cases, is also not an off-the-shelf software or tool that you can simply buy, deploy, and expect it to magically work. To make it very clear, it is not necessary for all of the components of a BI solution to be sourced from the same vendor, we will see more on this topic of components of a BI solution in later chapters, specifically in *chapter 9* and *chapter 10*. Just to provide you a quick idea, in one of the client projects that I worked in 2009, the BI solution consisted of IBM Datastage (an ETL tool), SAP Business Objects (an enterprise reporting and analytics

platform) with direct web access for ad hoc query for internal users, Microsoft SQL Server (database for data warehouse), and an in-house built web portal for static reports delivery and access for both internal users and customers among other smaller components. The data warehouse was built using a top-down (*Bill Inmon*) approach with a staging layer, integration layer, and a customer data mart layer. This project initially used a waterfall project management methodology and then later switched to agile methodology. There were mainly two technical teams, one for new development and enhancements, and another responsible for production support. Both the teams had specialists in ETL tool and RAP.

Important note: The technical terms such as data warehouse, data mart, ETL, various data layers, etc are covered in *chapters 9 and 10*. If you are not at all familiar with these terminologies it is recommended to first glance through the explanations provided in *chapter 9 and 10* and then come back to *chapter 1*.

A BI solution is not just a simple tool, it is not a software package that can easily be purchased by a business user, installed and is ready to use as it is being marketed by some of the vendors. Software marketed by such vendors will not necessarily suffice the needs of a business user. BI is a concept. Various parts/components of a BI solution can be bought, however, there is still work that needs to be done to put all of it together, to make it ready for use, unless it is a **BI as a service** (**BIaaS**) for a specific product.

BI doesn't solve problems on its own

BI doesn't solve problems on its own. Just having a BI solution doesn't mean it will solve all of your business problems. BI helps in identifying the existence of problems. As we have seen in the earlier section working of BI, the first output from BI is information. BI presents information to the user in the form of a summary or performance overview of the business. Various trends, patterns, correlations, anomalies, and outliers are presented to make it easier and comprehendible for the user to notice any problem areas that need attention. Depending on how well a BI system is built, and how much granular data is available in the data warehouse, the BI system can show where exactly the problem lies.

A BI solution won't necessarily answer the question of why exactly that problem has occurred, and how to fix it unless the answer is available in the data collected. The data collected in BI (data warehouse) is limited by what has been implemented up until that point. So, if there wasn't enough forethought to collect all of the relevant data, the BI system will be unable to answer those questions right away. If there was forethought and data is available in BI, BI can answer those questions too. In any case, the problems have to be solved by putting the actionable insights provided by BI into action by the decision makers. If decision makers decide not to act fully knowing the consequences, obviously just having a BI solution won't solve

problems or improve the business. Such problems are beyond the scope of BI and needs involvement of higher management to fix it.

Insights from BI is one of the inputs for decision making

If we were to state that companies make all their decisions based on insights from BI, we would be wrong. This fact might come as a surprise to some, who are new to business and are used to hearing or reading about analytics and insights for decision-making, as if there are no other inputs. That is not how a real business works. Quite a lot of decisions in businesses still continue to be based on gut feelings alone. Definitely more and more businesses are moving towards a data-driven decision-making approach. But even in such businesses, insights from BI are one of the inputs in the decision-making process. Sometimes, when a decision needs to be made, the decision maker relies on BI to understand the situation first, and sometimes insights from BI do trigger the decision-making process. However, insights from BI alone, even though are key inputs, are not the only input, and does not always result into a decision. There are other inputs too that should be considered before arriving at a decision.

Let's imagine a company that is in discussion with another company to acquire it. Will such information be available in the BI system? No, it's confidential information available only to a select group of people who are involved in acquisition process. Or what about information regarding a company's plans to launch a new product in the next few months? Will this information be available in the BI system? Most likely, no. Most of the data about a subject/product comes into production/operational systems only after the product is launched. Before launch only a small set of configuration data might be loaded and available.

As explained above it is not practical to have every single piece of information required for business decision-making within a BI solution. Apart from information that is not readily available in a BI system, the other main inputs are:

1. **Business strategy**: A company may knowingly go ahead with a short-term loss-making deal to onboard a strategic customer as part of its business strategy to expand in a new geographical market.
2. **Experience**: A senior manager who has a vast experience in mergers and acquisitions may decide not to proceed with an acquisition with a particular group of companies based on past experiences, regardless of how good the financial prospects may seem on paper.
3. **Intuition**: We see this all the time; a lot of people make decisions based on intuition.

Here, it is not intended to state that using other inputs is right or wrong, intention is to highlight the reality. So, to summarize, in businesses that use BI, we notice that other inputs are also considered before a decision is made as depicted in *Figure 1.9*:

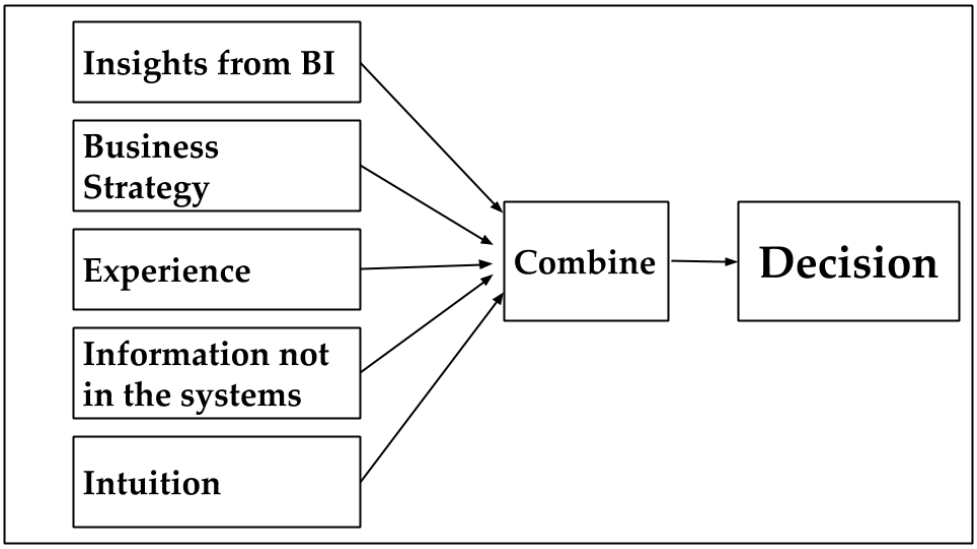

***Figure 1.9**: Inputs for decision making*

Ideal BI solutions are rare

Ideal BI solutions are rare and mostly exist only in theory. An ideal BI solution is one in which the solution contains data from all lines of businesses across the globe, including data about all products, customers, employees, partners, suppliers, etc., and the solution is built such that all relevant information is made available for all of the right business users at the right time and the solution is able to answer all the questions all the time.

Don't be under the assumption that there will be a well-built BI solution for the entire organization that has all the data it requires for the business to make all of its decisions. If you have worked for any large company, you would have noticed that there can be multiple BI solutions within the same company. Some, understandably have multiple BI solutions because of inorganic growth, but others due to poor planning, inter-departmental politics, siloed approaches, departmental initiatives vs enterprise initiatives, and so on. When companies acquire other companies, the acquired company most often comes with its own BI tech stack, and it is not easy to migrate to a common BI tech stack. It can take years, or it may be decided to retain the BI tech stack for cost reasons. And another point to note is that not all BI solutions are alike. Some organizations have built just the minimum capability such

as static reporting delivered via intranet or an internal portal or send out reports to users via email with no other access. Whereas other organizations have implemented solutions that contains several capabilities. Capabilities that enables users to interact, view, refresh, create, and publish their own reports and dashboards. Capabilities that enables collaboration between users, carry out ad hoc data analysis, etc. Also, have included web analytics, app analytics and other analytics products into the BI landscape. An architecture diagram for a contemporary BI solution is depicted in *Figure 1.10*:

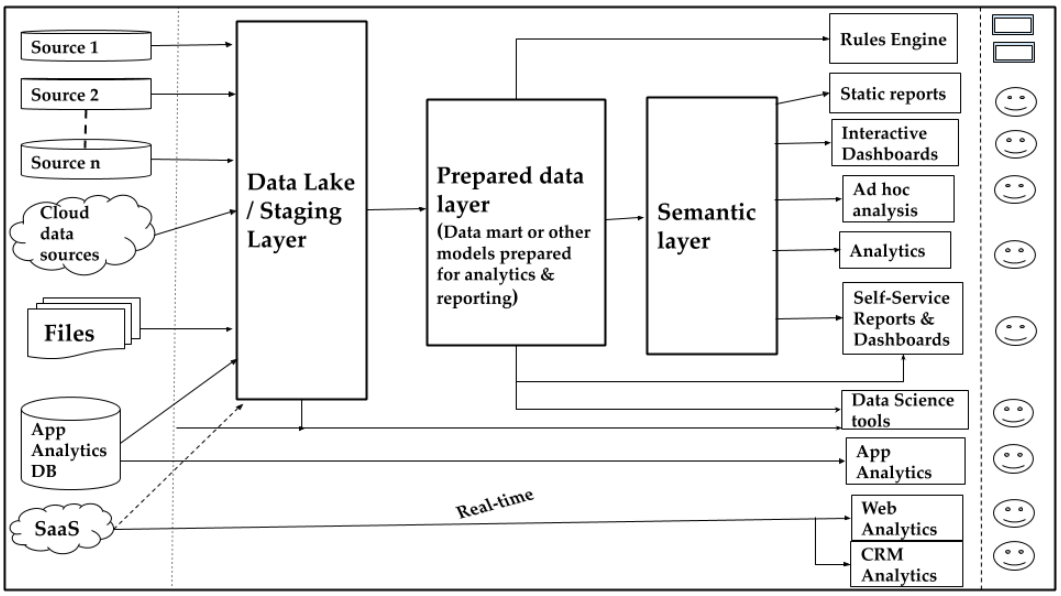

***Figure 1.10**: A sample architecture diagram for contemporary Business Intelligence*

We will cover more details on the topic of BI architecture in *Chapter 9: BI Architectures*.

Figure 1.10 provides us with a sense of how a high-level architecture of a BI solution looks. Just bear in mind that the '*Prepared data layer*' depicted in the figure above is a logical representation which can be implemented using various technologies. Also note that, in case of a large company, it is possible that there are multiple different instances of such BI solutions, for example, one per line of business or one per region, or one per subsidiary company, etc. Moreover, it is very much possible that the tech stack is different in different BI implementations within the same company.

BI solutions serve a variety of users

BI solutions are not only for the top management but it also serves a variety of users. Depending upon which functionalities are available in the BI landscape, a variety of users can take advantage of it. We can classify users broadly into two user types: basic users and power users.

A basic user may use a feature used by a power/advanced user but the degree to which they use a feature is different from the degree a power user will use the same tool for. Similar to how two users who use MS Excel software, one may use only basic features of Excel whereas the other user may use advanced features, but both are considered as users of the MS Excel tool. A basic user after acquiring some experience may graduate to a power user group. In one company, a **Vice President** (**VP**) may be a basic user, and in another company of the same size in the same industry a VP could be a power user. Data analysts, BI analysts, or any job role whose main job responsibility is to analyze data is always a power user. And usually, those whose main role is not analyzing data fall under the basic user type.

More details on BI roles are provided in *Chapter 5: Roles in Business Intelligence*. Apart from human users there can be other systems that use the output of a BI solution. For example, a rules engine in an insurance company could depend on pre-aggregated results provided by the BI solution to determine whether an existing customer is eligible for a lower premium. Or an email marketing system could depend on BI to narrow down a target group of customers. In such cases a technical account (system user) is used. In different companies, technical accounts are called differently, basically it's a non-human user. The following *Table 1.1* illustrates a typical mapping of some of the functionalities of BI and corresponding user types:

Functionality	Basic user	Power user	System user
Static reports	Yes	Yes	No
Interactive dashboards	Yes	Yes	No
Ad hoc analysis	No	Yes	No
Analytics general	Yes	Yes	No
Self-service reports & dashboards	No	Yes	No
Data mining tools	No	Yes	No
App analytics	Yes	Yes	No
CRM analytics	Yes	Yes	No
Web analytics	Yes	Yes	No
Data cleansing	No	Yes	Yes
Rules engine	No	No	Yes

***Table 1.1**: Functionalities mapped to user types*

Let's take one example to clearly understand how the usage of BI tools by a basic user is different from the usage of the same BI tool by a power user. The following *Figure*

1.11 is from PublicBI EUProc BI (publicbi.com) solution showcasing one example of a BI dashboard:

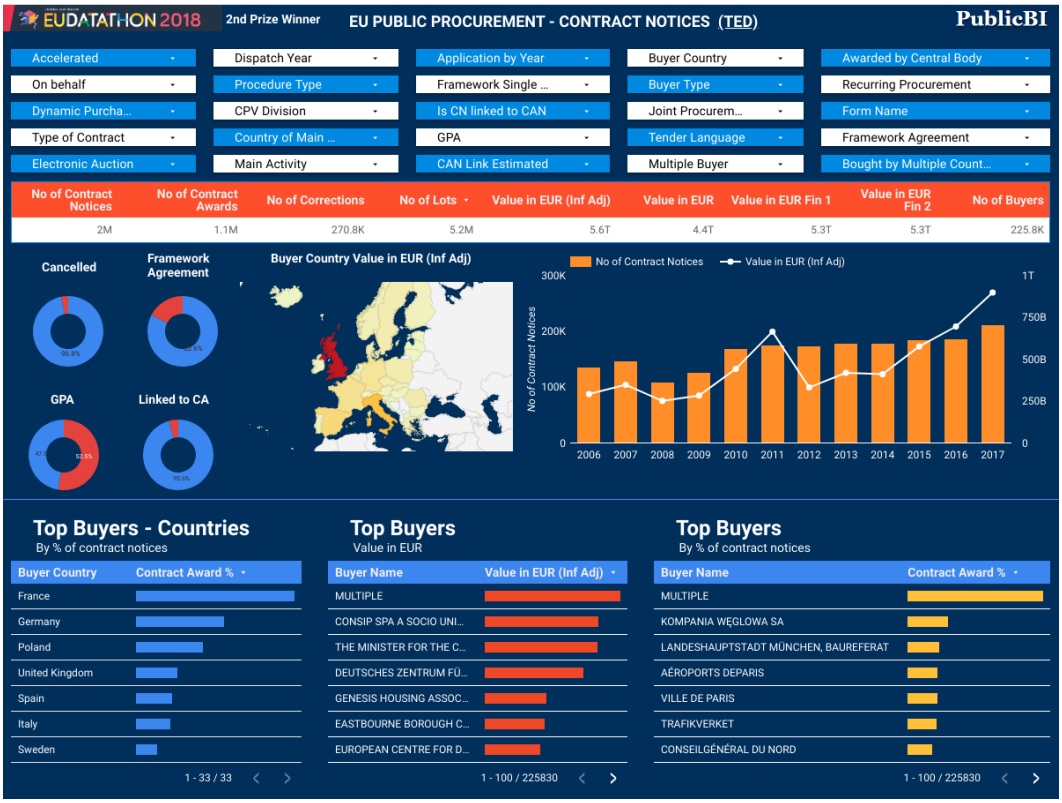

***Figure 1.11**: Example of a BI dashboard*

PublicBI EUProc is a BI solution that helps businesses and general public to find trends, patterns, correlations, and anomalies in EU public procurement[25]. A basic user of this dashboard views and interacts with it. For example, uses the filters on the top to drill down and find trends and patterns for specific values or combinations of values, and downloads the dashboard. Whereas a power user in addition to everything that a basic user does would also create new charts or edit existing charts, create new metrics, create new pages of dashboards, or create totally new dashboards based on the same data sources on which the dashboard is built or even include new sets of data sources and merge it with existing set of data sources. Power users may also clean the data before using it in the dashboard. In most cases, top management will be basic users and analysts will be power users. It should now be clear that BI serves a variety of users.

BI is not always expensive and a multi-year project

No, it doesn't cost millions and doesn't take multiple years to build every BI solution. Businesses are very dynamic these days, gone are the days when businesses had the luxury and patience to implement multi-year BI projects to get the first result out. And gone are the days when businesses had the organization structure fixed for multiple years. Now companies are carrying out organization changes anecdotally at least once a year. **A 2013 McKinsey survey** found that large scale organization changes were made in most companies more often than every three years, as was the norm. In addition to org changes, companies are acquiring other companies or are being acquired, and companies are introducing new products, product lines at a faster pace than ever before.

With these kinds of trends, it doesn't make sense for most businesses to venture on building BI solutions that will take years to build spending large sums of money, if they do, there are high chances of failure for two main reasons:

1. As organizations restructure themselves, some of the projects and programs get scraped off or are placed on hold as the original sponsor is no longer in the same role and there probably is no other sponsor.
2. The original requirements become obsolete.

There was and there is a real need to build BI solutions faster and with less cost. The good news is that with advancement in cloud services and a whole range of offerings from various leading cloud service providers, a first version of usable BI solution can be implemented in a couple of months if not in weeks with zero **capital expenditure** (**CapEx**). Hence, there is actually no need to spend millions upfront or run multi-year projects to implement BI solutions before results are visible. In *Chapter 7: Ideas for Success with BI* several ideas to speed up building a BI solution are covered.

Many more such misconceptions about BI are known, however, we cannot clarify all of those in this chapter without covering some more topics of BI. As mentioned earlier we will continue to clear misconceptions in the relevant chapters. In the next section, we will clear the confusion on who actually coined the term *Business Intelligence*.

Demystify coinage of BI

When I began my journey in the field of BI in 2006, BI was already a hot topic in the IT industry. So, surely it was coined well before I entered the field. Some companies had already implemented BI solutions backed by solid data warehouses and were enhancing it with additional data marts, others had projects in progress and some

big companies were still considering if they should go ahead with a BI project or not. Large IT service companies, Infosys for instance, was restructuring the organization to build a centralized BI department with hundreds, if not thousands of BI consultants by replacing the previous structure in which BI talent was spread across various verticals such as retail, banking, insurance, telecommunications, etc. To arrive at a conclusion on this topic of coinage of BI, I had to do quite a bit of research, and this part of the chapter took maximum time as I have to rely on what is available in reliable books and articles than on my experience.

Business Intelligence as an umbrella term, is a field or subject that refers to a set of concepts and methods to improve business decision making using data was coined by *Howard Dresner* in 1989[1][2].

Some sources[3][4] claim that *Richard Miller Devens* coined the term Business Intelligence in 1865. I would like to, with all due respect, disagree and contest that claim. By reading the extract about *Henry Furnese* from the book "*Cyclopaedia of Commercial and Business Anecdotes*"[5] authored by *R.M. Devens* to which the sources attribute the coinage of the term business intelligence, it is evident that the author (*R.M. Devens*) has not used business intelligence as a subject or field related to business data but rather, he had used the term "*intelligence*" to mean news. It is also interesting to find that the extract about *Henry Furnese* is in the book "*The Banker's Magazine and Statistical Register*"*[6]* published in the year 1850 (15 years earlier than *R. M. Devens* book) but without the word "*business*" in it. So, one could argue that *R. M Devens* first used the words "*business*" and "*intelligence*" together to mean news (Note: the word *news* was referred to in a context other than business) that could provide an advantage (unfair advantage, as news was fabricated too) to Henry's business by knowing them earlier than others would come to know of it.

Similarly, some other source[8] claim that the term business intelligence was first coined by IBM researcher, *Hans Peter Luhn* in 1958, based on his paper "*A Business Intelligence System*"[7]. While there is no denying that the term "*Business Intelligence System*" was coined by *H.P. Luhn*, anyone who has read the aforementioned paper would agree that H.P. Luhn proposed a specific system that would disseminate information automatically to overcome the communication challenges that were faced by businesses during those times and it was not addressing the aspects of data analysis, data analytics, decision support, decision-making, or deriving information and insights from data.

BI as a concept that we use today is different from a specific business intelligence system that *H.P Luhn* had proposed. Just like some words in English language (or any language for that matter) can have multiple meanings, the business intelligence system that was proposed by *H.P Luhn* has a different meaning to any of the BI systems or solutions that we have built based on the concept of business intelligence. Therefore, the conclusion that Howard Dresner coined the term business intelligence is more accurate.

Conclusion

With that take on the coinage of business intelligence, we come to the end of the chapter. Initially I had planned to cover the evolution of BI also in this chapter, however, I found that that the evolution of BI will be better understood by learners after understanding the details of why businesses actually need BI. So, we will cover evolution of BI as a section in the next chapter, which mainly deals with the question why businesses need BI.

In this chapter, we have covered the definition of business intelligence, explained each and every important term in the definition of BI. As we progress through the chapters, we will go into more details on some of the aspects that we have not gone into detail in this chapter. Here the focus was to get a good conceptual understanding of BI, clear some of the common misconceptions about BI, bring out some of the realities of BI, and clarify that BI is a concept and not limited by tools or technologies. A high-level overview of working of BI was provided. And finally, the topic of coinage of business intelligence has been clarified. It's important to note that new names for the same concepts or new technology to implement same concepts will keep popping up but once we have a strong foundation with concepts, we should be able to deal with the changes without many difficulties. Also, it really doesn't matter who actually coined the term business intelligence. As long as we understand the concept and use it to improve the business.

In the next chapter you will learn about the need of BI for business.

Points to remember

Some of the key points to remember are listed as follows:

- BI is a concept or a process.
- BI is not limited by type of data, technologies, tools, or methodology. BI is technology, tools, and methodology agnostic.
- BI is essential for business improvement.
- BI is not just the frontend that BI business users use. There is a lot in the backend that business users don't see (they don't have to).
- When context and meaning is provided to data, it becomes information.
- The word business in business intelligence is not limited to commercial (for profit) enterprises.
- BI provides one of the main inputs for decision-making, but all decisions in businesses all the time are not fully based on BI alone.
- There can be more than one BI solution in an enterprise.

- A variety of users, from basic to advanced, are served by BI.
- BI solutions can now be built in weeks without any CapEx.
- BI is an umbrella term referring to the overall process in which information and insights are derived from data in a scalable, efficient, and on-going basis, and made available to decision makers to support data-driven decision-making in order to improve the business.

Multiple choice questions

1. **Business Intelligence is a**
   a) Product
   b) Process/concept
   c) Technology
   d) Tool

2. **Which of these organizations could use business intelligence?**
   a) A retail chain
   b) Police department
   c) Not-for-profit organizations
   d) All of the above

3. **Business Intelligence deals with**
   a) Internal business data
   b) External data
   c) Social media data
   d) All of the above

4. **What data is available in BI?**
   a) Any data that business decides to use for BI purposes
   b) Only financial data
   c) Only marketing data
   d) Only daily transaction data

5. **There is a recurring requirement to notify customers about new offers when the sum of their transactions at a retail store exceeds 1200 EUR in a 6-month period. Which user type of BI should be used?**
   a) Basic user
   b) Power user
   c) System user
   d) None of the above

6. **Which of these statements is most accurate about a data-driven organization?**
   a) All decisions are based on BI
   b) No decisions are based on BI
   c) Some decisions are based on BI
   d) Most decisions are based on BI

7. **Who coined the term business intelligence in the way it is used now?**
   a) R M Devens
   b) Howard Dresner
   c) Hans Peter Luhn
   d) Henry Furnese

8. **You find a series of numbers in a spreadsheet in a shared folder, there are no headers nor any documentation. In the context of BI, how would you classify it?**
   a) Data
   b) Information
   c) Insight
   d) None of the above

9. **Business Intelligence**
   a) Includes data visualization
   b) Includes business analytics and data mining
   c) Is automation or semi-automation of information and insight generation process
   d) Includes all of the above

10. **Which of these is a buzzword?**
    a) Artificial Intelligence
    b) Big data
    c) Data mining
    d) Data

11. **"There is an increase of 2% in number of customers visited per day for the last 10 days", to a store manager this is**
    a) Data
    b) Information
    c) Insight
    d) None of the above

Answers

1. **b**
2. **d**
3. **d**
4. **a**
5. **c**
6. **d**
7. **b**
8. **a**
9. **d**
10. **b**
11. **b**

Questions

1. What are some of the misconceptions of BI that you have come across?
2. What is the definition of business intelligence?
3. What are the four main reasons that there is so much confusion about BI?
4. Why do business users wrongly assume that BI is only the frontend?
5. What is the core concept of BI?

6. What does data, information, and insight mean in the context of BI?
7. In the context of BI how is intelligence defined?
8. What are the real pain points that BI addresses?
9. Other than insights from BI what are the other inputs considered for decision making, and why? Explain with an example.
10. Explain how decisions are made in organizations that doesn't use BI?
11. What are some of the reasons for companies to end up with multiple BI solutions?
12. What are the differences between a power user and a basic user?
13. Why doesn’t it make sense for most businesses in current times to invest in BI solutions that cost millions of dollars and takes multiple years to build?